CLAIMS

We claim:

1. An electrically neutral composition in a form of a water-in-oil or an oil-in-water emulsion, in which droplets of the emulsion on discharge from an aerosol spray device are imparted with a unipolar electrostatic charge, which composition comprises:

(a) at least one propellant in an amount of about 2 to about 80% w/w;

(b) at least one non-ionic surfactant in an amount of about 0.01 to about 10% w/w;

(c) optionally at least one oil or solvent within an oil phase of the emulsion in an amount up to about 80% w/w.;

(d) at least one compound selected from the group consisting of polar, ionic, aromatic, and linearly conjugated, in an amount of about 0.01 to about 80% w/w based on the non-ionic surfactant, but which is such that a theoretical conductivity of the emulsion is less than a bulk conductivity of the emulsion; and

(e) water.

2. The composition as claimed in claim 1, wherein a difference between the theoretical conductivity of the emulsion and the bulk conductivity of the emulsion is at least about + 0.5 $\mu S\ cm^{-1}$.

3. The composition as claimed in claim 2, wherein the difference between the theoretical conductivity of the emulsion and the bulk conductivity of the emulsion is at least about + 4 $\mu S\ cm^{-1}$.

4. The composition as claimed in claim 2, wherein the difference between the theoretical conductivity of the emulsion and the bulk conductivity of the emulsion is at least about + 6 $\mu S\ cm^{-1}$.

5. The composition as claimed in claim 1, wherein at least about 90% by volume of the droplets of the disperse phase within the emulsion have an average diameter of less than about 60 μm.

6. The composition as claimed in claim 5, wherein at least about 90% by volume of the droplets of the disperse phase within the emulsion have an average diameter in a range of about 20 to about 40 μm.

7. The composition as claimed in claim 1, wherein the at least one non-ionic surfactant is selected from the group consisting of mono, di and tri sorbitan esters; polyoxyethylene mono, di and tri sorbitan esters; mono and polyglyceryl esters; alkoxylated alcohols; alkoxylated amines; alkoxylated acids; amine oxides; ethoxylated/proproxylated block copolymers; alkoxylated alkanolamides; and alkoxylated alkyl phenols.

8. The composition as claimed in claim 7, wherein the at least one non-ionic surfactant contains at least one group containing at least one C_6 to C_{22} carbon chain, the at least one group being selected from the group consisting of alkyl, allyl and substituted phenyl.

9. The composition as claimed in claim 1, wherein component (d) is selected from the group consisting of

a) alkali metal salts, alkaline earth metal salts, ammonium salts, amine salts or amino alcohol salts of at least one of the compounds selected from the group consisting of: alkyl sulphates, alkyl ether sulphates, alkylamidoether sulphates, alkylarylpolyether sulphates, monoglyceride sulphates, polyglyceride sulphates, alkyl sulphonates, alkylamine sulphonates, alkyl-aryl sulphonates,olefin sulphonates, paraffin sulphonates, alkyl sulpho-succinates, alkylether sulphosuccinates, alkylamide sulphosuccinates, alkyl sulphocinnamates, alkyl sulphoacetates, alkyl phosphates, alkylether phosphates, acyl sarcosinates, acyl isothionates and N-acyl taurates;

b) alkyl amidopropylbetaines, alkylamido-betaines, alkylamidosulphobetaines, alkylbetaines, aminimides, quaternary ammonium compounds and quaternary phosphonium compounds;

c) carboxylic acids, carboxylic acid salts, esters, ketones, aldehydes, amides or amines of carboxylic acids containing from 6 to 30 carbon atoms;

d) diethyl orthophthalate, methylphenylcarbinyl acetate, α-methyl ionone, 4-hydroxy 3-methoxy-benzaldehyde, phenylethyl alcohol, dipropylene glycol, styryl acetate, n-butyl benzoate, isopropyl 4-hydroxybenzoate, isobutyl acetophenone, isopropyl acetophenone, nicotinic acid, benzoic acid, 2-napthol, neopentyl benzene, naphthalene, toluene, fullerene,

tannic acid, t-butylacetophenone, isopropylcinnamte, resorcinol, 4-methoxycinnamalde-hyde, arbutin, 4-acetoxy-3-methoxycinnamaldehyde, 4-isopropylphenol, trans-stilbene, esculetin, p-chloro-m-xylenol, chloro-o-cresol, triclosan, norfenefrine, norepinephrine, hexyl-resorcinol, limonene, methylphenylcarbinyl acetate and p-tert-butyl-α-methylhydrocinnamic aldehyde.

10. The composition as claimed in claim 1, wherein component (d) is present in the composition in an amount of about 0.01 to about 30% w/w based on the weight of component (b).

11. The composition as claimed in claim 10, wherein component (d) is present in the composition in an amount of about 0.01 to about 10% w/w based on the weight of component (b).

12. The composition as claimed in claim 1, wherein the droplets formed on discharge from an aerosol spray device have a charge to mass ratio of at least about +/- 1 x 10^{-4} C/kg.

13. The composition as claimed in claim 12, wherein the droplets formed on discharge from an aerosol spray device have a charge to mass ratio of at least about +/- 2 x 10-4 C/kg.

14. The composition as claimed in claim 1, which is an insecticidal composition which contains at least one insecticide in an amount of about 0.001 to about 5% w/w.

15. The composition as claimed in claim 1, wherein the oil or solvent is present and is selected from the group consisting of aliphatic, linearly conjugated and aromatic compounds.

16. The composition as claimed in claim 15, wherein the oil or solvent is present in an amount up to about 40% w/w.

17. A method of enhancing the unipolar charge which is imparted to droplets of an emulsion on discharge from an aerosol spray device, the method comprising forming the droplets from an oil-in-water or a water-in-oil emulsion composition which comprises:

(a) at least one propellant in an amount of about 2 to about 80% w/w;

(b) at least one non-ionic surfactant in an amount of from 0.01 to about 10% w/w;

(c) optionally at least one oil or solvent within an oil phase of the emulsion in an amount of up to about 80% w/w;

(d) at least one compound selected from the group consisting of polar, ionic, aromatic, and linearly conjugated, in an amount of about 0.1 to about 80% w/w based on the non-ionic surfactant, but which is such that a theoretical conductivity of the emulsion is less than a bulk conductivity of the emulsion; and

(e) water.

18. The method according to claim 17, wherein the oil or solvent is present and is selected from the group consisting of aliphatic, linearly conjugated and aromatic compounds.

19. The method according to claim 18, wherein the oil or solvent is present in an amount up to about 40% w/w.

20. A method of enhancing the electrostatic charge imparted to droplets of a composition in a form of a water-in-oil or an oil-in-water emulsion on discharge from an aerosol spray device in which the composition includes:

(a) at least one propellant in an amount of about 2 to about 80% w/w;

(b) optionally at least one oil or solvent within an oil phase of the emulsion in an amount of up to about 80% w/w; and

(c) water;

the method comprising mixing with the composition a non-ionic surfactant and at least one compound selected from the group consisting of polar, ionic, aromatic, and conjugated, in an amount of about 0.01 to about 80% w/w of the compound based on the non-ionic surfactant, and the amount of the compound being such that a theoretical conductivity of the emulsion is less than a bulk conductivity of the emulsion.

21. An aerosol spray device which contains an electrically neutral composition in a form of a water-in-oil emulsion, an oil-in-water emulsion or a single phase composition, in which liquid droplets of the composition on discharge from the aerosol spray device are imparted with a unipolar electrostatic charge, wherein a formulation of the composition and a material of a portion of the aerosol spray device with which the emulsion comes into contact on spraying are selected such that at least one of the following is true:

Amended Sheet

i) a difference in the surface energies between a Lewis base component of the emulsion and a Lewis base component of the material with which the emulsion comes into contact on spraying is at least about + 2 mJ m^{-2}; and

ii) a difference in the surface energies between a Lewis acid component of the emulsion and a Lewis acid component of the material with which the emulsion comes into contact on spraying is at least about + 0.5 mJ m^{-2}.

22. The aerosol spray device as claimed in claim 21, wherein at least one of the following is true: the difference in i) is at least about + 5 mJ m^{-2} and the difference in ii) is at least about + 1 mJ m^{-2}.

23. The aerosol spray device as claimed in claim 22, wherein at least one of the following is true: the difference in i) is at least about + 15mJ m^{-2} and the difference in ii) is at least about + 2 mJ m^{-2}.

24. The aerosol spray device as claimed in claim 21, wherein the composition contained therein comprises:

(a) at least one propellant in an amount of about 2 to about 80% w/w;

(b) at least one non-ionic surfactant in an amount of about 0.01 to about 10% w/w;

(c) optionally at least one oil or solvent within an oil phase of the emulsion in an amount up to about 80% w/w.;

(d) at least one compound selected from the group consisting of polar, ionic, aromatic, and linearly conjugated, in an amount of about 0.01 to 80% w/w based on the non-ionic surfactant, but which is such that a theoretical conductivity of the emulsion is less than a bulk conductivity of the emulsion; and

(e) water.